some part or other of the long spectrum a band of absorption, or maximum of opacity, occurs; and the position of this band affords a highly distinctive character of the substance which produced it.

Among natural crystals, besides the previously known yellow uranite, the author found that in adullaria, and felspar generally, a strong fluorescence is produced under the action of the rays of high refrangibility, referable not to impurities, but to the essential constituents of the crystal. A particular variety of fluor-spar shows also an interesting feature, though in this case referable to an impurity, exhibiting a well-marked reddish fluorescence under the exclusive influence of rays of the very highest refrangibility. This property renders such a crystal a useful instrument of research.

With some metals broad, slightly convex electrodes were found to have a great advantage over wires, exhibiting the invisible lines far more strongly, while with some metals the difference was not great.

The blue negative light formed when the jar is removed, and the electrodes are close together, was found to be exceedingly rich in invisible rays, especially invisible rays of moderate refrangibility. These exhibited lines independent of the electrodes, and therefore referable to the air. This blue light has a very appreciable duration, and is formed by what the author calls an arc discharge.

The paper concludes with some speculations as to the cause of the superiority of broad electrodes, and of the heating of the negative electrode.

XI. "On the Reflexion of Polarized Light from Polished Surfaces." By the Rev. Samuel Haughton, M.A., F.R.S., Fellow of Trinity College, Dublin. Received June 9, 1862.

(Abstract.)

When a plane-polarized beam of light is incident on a polished surface at a certain angle of incidence, and polarized in a certain azimuth, the reflected beam of light is circularly polarized.

The tangent of this angle of incidence is called by the author the Coefficient of Refraction, and upon it appears to depend the *brilliancy* of a polished surface.

The cotangent of the azimuth of incident polarization is called the Coefficient of Reflexion, and upon it appears to depend the rich *lustre*, strikingly exhibited in polished copper and gold.

The paper contains an account of the experiments made to determine, with precision, these constants for the following substances:—

A. *Transparent Bodies.*

1. Munich glass (*a*).
2. Munich glass (*b*).
3. Paris glass.
4. Fluor-spar.
5. Glass of antimony.
6. Quartz crystal.

B. *Pure Metals.*

1. Silver.
2. Gold.
3. Mercury.
4. Platinum.
5. Palladium.
6. Copper.
7. Zinc.
8. Lead.
9. Bismuth.
10. Tin.
11. Iron and steel.
12. Aluminium.

C. *Alloys.*

1. Copper and tin (speculum metal).
2. Copper and zinc (10 Cu+Zn).
3. „ „ (9 Cu+Zn).
4. „ „ (8 Cu+Zn).
5. „ „ (7 Cu+Zn).
6. „ „ (6 Cu+Zn).
7. „ „ (5 Cu+Zn).
8. „ „ (4 Cu+Zn).
9. Copper and zinc (3 Cu+Zn).
10. „ „ (2 Cu+Zn).
11. „ „ (Cu+Zn).
12. „ „ (Cu+2 Zn).
13. „ „ (Cu+3 Zn).
14. „ „ (Cu+4 Zn).
15. „ „ (Cu+5 Zn).

The determination of the optical constants of these substances leads to many interesting conclusions; among which the following may be stated:—

1. That transparent bodies, as well as metals, possess a coefficient of reflexion, which is sometimes very sensible, although there are bodies in which it is very small.

2. That *Silver* is the only substance which possesses the qualities of *brilliancy* and *lustre*, represented by the coefficients of refraction and reflexion, in a high degree.

3. Of the metals which have high *brilliancy* and little *lustre* may be named *Mercury*, *Palladium*, *Zinc*, and *Iron*.

4. Of the metals which have high *lustre* and little *brilliancy* there are only two, *Gold* and *Copper*.

5. Results of the highest interest appear from an examination of

the optical constants of the alloys of copper and zinc, which cannot be given in an abstract.

6. In the details of the several experiments, the author calls attention to several remarkable laws, or indications of laws, which appear to him to require some notice from theorists.

a. When the azimuth of the incident beam is less than the circular limit, the axis major of the reflected ellipse, at the principal incidence, lies in the plane of incidence; but when the azimuth is greater than the circular limit, it is perpendicular to the plane of incidence, and as the incidence varies, the axis major twice approaches to a minimum distance from that plane.

b. There appears to the author to be some indication in the experiments on metals, that the quantity known to theorists as $\left(\frac{J}{I}\right)$ is not a function of the incidence only; a conclusion which, if correct, would require the intervention of a third wave suppressed, or some such theoretical supposition, to account for it.

XII. "On the Loess of the Valleys of the South of England and of the Somme and the Seine." By Joseph Prestwich, Esq., F.R.S. Received June 19, 1862.

(Abstract.)

In this paper the author takes up and discusses a point connected with the former inquiry, but postponed in the paper he read before the Royal Society in March last, a recent visit to France having led him to form a conclusion with regard to the origin of the Loess sooner than he then expected.

On that occasion he referred the loam and brick-earth, with land and freshwater shells, which occurs in the valleys and on many of the hills in the South of England and North of France, to temporary inundations of the old rivers. On the present occasion he shows that this deposit is intimately connected with the origin of the river-valleys and with the fluviatile high- and low-level gravels described in his last paper.